

SOME VERY CURIOUS FACTS ABOUT RATTLESNAKES.

Written for the Sunday Journal by Horace Green, Member of the American Museum of Natural History.



THE great American rattlesnake, the only important American snake, is now receiving a great deal of attention from scientists, naturalists and investigators.

Dr. Thomas Stockton Baker, of Johns Hopkins University, a snake expert who is as entertaining as he is profoundly scientific, has just imparted a great deal of information concerning the rattler.

According to Dr. Baker, if you cut off the head of a rattlesnake and then pinch its tail, the headless ruff will fly back and strike your hand. This is extraordinary, and would be hard to believe if it were not vouched for by a scientist of high standing. I quote Dr. Baker's own words:

"If you decapitate a snake and then pinch its tail the stump of the neck will return and with more or less accuracy strike your hand, provided you have nerve enough to hold on. When this experiment was made some time ago in the laboratory of a physiologist of my acquaintance one young man, who was skeptical of the possibility of this movement, was so terrified at receiving a blow from the bloody stump that he swooned dead away."

"Several old experimenters repeated the test, but each confessed that nausea succeeded shortly after. Now, the majority of these men were physicians, some of them blessed with an extensive practice, and accustomed, perhaps, hardened, to the sight of terrible mutilations. Nevertheless, that mysterious dread of the snake and the spectacle of a headless reptile in action were sufficient to overcome them."

The scientific explanation of this performance of the snake is probably to be found in the fact that the nerves and muscles of the reptile live some time after the head is cut off, and that the nervous centre which controls movement is situated not in the head but in the backbone. This does not make it less horrible or uncanny.

There are two questions concerning the rattlesnake which are now greatly puzzling science.

One is, Why does the rattlesnake have rattles?

The other is, Does the rattlesnake fascinate its victims?

As we all know, the rattle serves the very useful purpose of warning man of the vicinity of the snake. Obviously it was not developed for this purpose, because it is a source of danger to the snake. The doctrine of evolution indicates that a feature of this kind must have been developed for some purpose beneficial to the snake. The snake is to find what that was.

Professor N. S. Shaler, a very distinguished Harvard naturalist, once thought that the rattle had no more utility than the corns on our toes. But one day he was wandering in a field when he heard a noise which he thought was produced by a locust, but found was the rattling of a snake. Then he formed the idea that the snake made its rattling sound in order to lure insect eating birds within his reach. The snake with its tail makes a sound like a fine, fat, active grasshopper, the early bird hastens after him and is devoured by the snake.

Professor Shaler published this theory and was fiercely attacked by other investigators. Some of them pointed out that birds were not guided by their ears. Others showed that the rattlesnake did not catch particularly for insect eating birds. It was also suggested that the rattle was used as a signal for assembling the sexes.

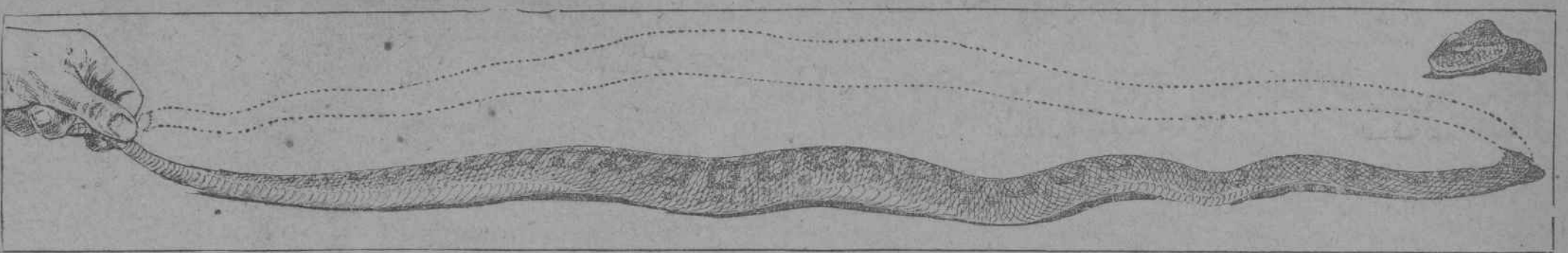
The most acceptable theory now appears to be that the rattle serves to frighten the enemies and victims of the snake, just as does the roaring of a lion or a tiger. It seems quite possible that some small animals and birds are paralyzed with fear at the sound of the snake's rattle.

Here the question of the alleged powers of fascination of the rattlesnake comes under consideration. Hundreds of reliable witnesses declare that they have seen little birds and mammals fascinated by the snake's eye and drawn irresistibly into its mouth. William Gilmore Sumner, an early American novelist, even told a story about a maiden who was fascinated by "the rich, starlike gaze" of a rattlesnake, and slowly drawn toward the reptile. That tale was generally accepted, and it is now believed by some that snakes are capable of fascinating children.

Dr. Thomas Stockton Baker furnishes a very ingenious and scientific explanation of the alleged powers of fascination. He thinks that the animals which appear to be fascinated really lose their lives through curiosity. Curiosity is a fault of the animal world quite as much as of man.

"It is notorious," says Dr. Baker, "that all birds and many small mammals possess inordinate curiosity. Consider the foraging cat and you will be convinced of this. The cat pursues its stealthy way through the wood, while the birds, one of which is destined to become its prey, gather from some distance and give vent to a peculiar cry. Surely instinct teaches them the predatory nature of the cat, and they recognize in it a terrible foe, but still they gather until scores of them are flitting overhead or among the trees and bushes."

"The cat, however, glides along as if birds were the last thing in creation it has in mind. The birds, encouraged, perhaps, by this attitude on the part of their natural enemy, become saucy and daring. They



Illustrating This Strange Phenomenon: If You Cut Off the Head of the Rattlesnake and then Pinch His Tail the 'Bloody' Stump of the Neck Will Fly Back and Strike Your Hand—As Shown by the Dotted Line.

approach nearer and nearer, and eventually some come within reach of the hunter. Flash goes the cat's paw, and one of the birds pays the penalty of its foolishness, of its curiosity to discover the motive of the cat's inaction.

"As this unconquerable spirit of foolish inquiry leads so often to the destruction of the birds by the cats, may it not be offered in explanation of the so-called fascination which asher birds and small animals of equal inquisitiveness into the jaws of the rattlesnake? Curiosity causes the birds to approach the cats when there is nothing remarkable in their movements, when the cats are preying on other animals. The mere presence of the cat could hardly be termed an element of fascination for the birds. Nor is there anything in the aspect of a coiled, motionless rattler to arouse the curiosity of the birds and small mammals unless it is purely the physical aspect."

"Color and bright objects are especially attractive to the small creatures. Therefore I should not wonder if the hard, scintillating eyes and variegated scales of the rattlesnake did not constitute that 'magnetic force' which is capable of luring feathered and furry victims within deadly range."

Dr. Weir Mitchell and others by experiments on snakes and mice and birds in captivity have endeavored to prove that fascination does not exist in the sense that the snake draws his victims into his mouth. The birds and mice, when they find themselves unloathed, become quite cheerful and hop about on the snake. If he is not hungry he will not attack them.

By the way, there is a true story of a courageous rabbit, which killed a huge lion constrictor in the Paris Zoological Garden by nipping the back of the snake's head.

Another very distinguished American snake sharp is Dr. Leonard Stejneger, of the Smithsonian Institution. He does not think that the experiments on rattlers in captivity are conclusive, because in that condition they lose their proud spirit. Dr. Stejneger, with many others, holds that the so-called fascination is a form of fear paralysis, which affects the snake's victim. The latter is in the position of a man who, seeing an express train rushing down on him, is so stricken with fear that he is unable to move.

Dr. Stejneger thinks that there may be

ly, but their practical value must be small, since in the war of 1897 neither power used them.

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an element of truth in all these theories, both about the rattle and the powers of fascination of the snake. After all, there is a possibility that the rattlesnake only shakes his rattles as a means of disposing of superfluous nervous energy, just as the dog shakes his tail. This point and that of the alleged power of fascination remain equally in doubt, and investigators have done nothing but make observations and theories.

The head of the rattlesnake, when dissected, is an object of remarkable interest. The poison fangs occupy the place of the canine teeth in other animals, and contain a groove, the upper end of which is fastened to a bone in the cheek, which moves with ease, so that the fangs when not in use can be folded or packed away. The saliva of all animals, even man, contains poison, though in man it is greatly diluted and of use in assisting digestion.

In the poisonous snakes it is collected into sacs, or glands, placed on each side of the upper jaw. A delicate canal extends from the poison gland forward under the eye to the edge of the jaw, and there opens into the fang, and to use the poison the snake has but to strike the prey, as the fangs enter the flesh the muscles of the jaw press upon the poison glands, squeeze the poison through the little canal down through the hollow of the poison fang in the wound.

There is a most ingenious arrangement in the fang. The opening is not at the very tip, where it would be liable to get plugged up with skin and flesh, but it is a little way up in front of the groove, so that the sharp point goes in first and makes a little hole, into which the poison flows.

The rattlesnake belongs to the order of "pit vipers," which are so called because they have a pit or hole in each side of the head, between the eye and the nostril. Nearly all venomous American snakes, including the moccasin and the copperhead, have this mark. Another common characteristic of these snakes is a thick body and a flattened triangular head. These are often said to be characteristics by which venomous snakes can be distinguished from non-venomous. This is, however, not true of the harlequin snake, which has the characteristic of harmless snakes. There are, in fact, no absolutely reliable general rules by which venomous snakes can be distinguished from non-venomous.

There are seventeen species of the rattlesnake in the United States. The Northern rattlesnake (*Crotalus horridus*) is found in every State from the Gulf of Mexico to Northern New England. The diamond rattler (*Crotalus adamanteus*) is strictly a Southern species, found south of the Carolinas, and in the same locality is found the ground rattler. The greatest variety, however, seems to occur in the Western States, Arizona and New Mexico containing several different species, while in California and Oregon is found the *Crotalus lecontei*, or black rattler.

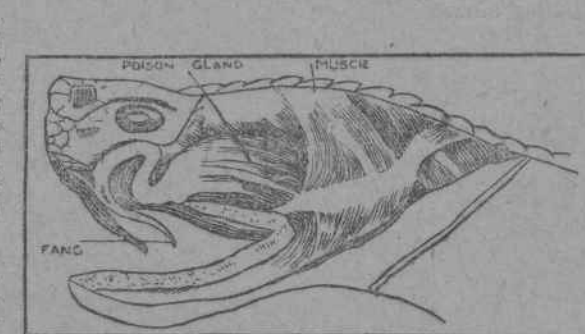
Their bite is extremely dangerous, but not necessarily fatal. Most animals succumb to it, and man, if proper remedies are not at hand. In most localities there is some one who is willing to supply a remedy for snake bite. Onions are also very good, as, when applied to the wound, they will draw out the poison.

Professor Frazer, of Edinburgh, discovered that the serum of the blood of an animal whose whole system was impregnated with snake poison, or the blood serum of the poisoner's reptile itself, is an excellent remedy for snake bite. He found out the minimum dose required to kill an animal, and, starting with an amount much smaller than this, increased the dose at intervals of ten days until he found that the animal was taking fifty times the minimum dose, or enough snake poison to kill fifty animals of its own weight and size, without developing any bad effects therefrom. He then injected into a healthy animal some snake poison; and as soon as it began to produce

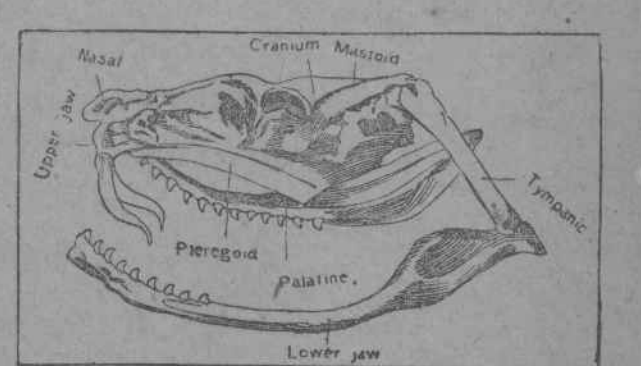
ideal engines of 720 horse-power, supplied with force by accumulators, which have given much trouble. She can do fifteen knots on the surface, and has descended to a depth of sixty-five feet. In recent trials she easily torpedoed the Magenta, when that ship was stationary, but she had to come to the surface at a distance

of about 300 yards from her target. Under water she only obtains eight knots.

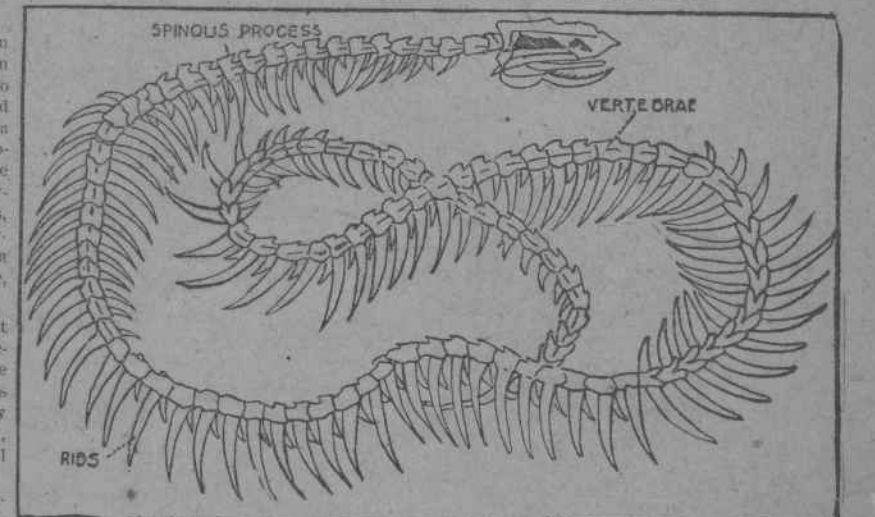
The Morse, of 141 tons, is similar in construction and design, but only does twelve and a half knots on the surface. The Narval, building at Cherbourg, from the plans of M. Laubeuf, who won the prize in the recent French competition for submarine boat designs, will be of 106 tons displacement, 111 feet long and 15



Head of the Rattlesnake, Showing the Poison Gland and the Muscles by Which He Forces Poison Into His Fangs. (Sketched by M. C. Holmes.)



Skeleton of the Rattlesnake's Head, Explaining How the Fangs Are Erected when the Jaws Are Opened. (Sketched by M. C. Holmes.)



Complete Skeleton of a Rattlesnake, Showing His 200 Vertebrae, and Why He Moves Along So Easily. (Sketched by M. C. Holmes.)

a bad effect on the animal he immediately injected into the wound the blood serum of the poisoned animal, which serum immediately counteracted the bad effects of the poison.

Another snake, perhaps more feared by some than the rattler, is the copperhead (*Ancistrodon contortrix*), known as the cottonmouth moccasin and red eye in the South. It ranges from the Catalina to the Gulf States, and west of the Mississippi River; generally attains a length of two feet and inhabits grassy meadows, also mountain regions, where it preys upon small animals, rarely attacking large ones, unless stepped upon. Sometimes cows and horses,

not seeing the copperhead in the long grass, accidentally tread on it and are immediately bitten.

The water moccasin (*Ancistrodon piscivorus*) is of a very pugnacious disposition and will with savage ferocity attack both man and brute. It is found from the Pedee River to the Gulf States. In Texas there is a species known as the Texas moccasin, but the great stronghold of this animal is the great swamp of Southern Florida. These reptiles are essentially water snakes and live principally upon fishes and small reptiles.

The moccasin and the copperhead are cousins of the rattler.

A Woman Who Swallows Swords By the Armful.

SWORD swallowing is as old as Hindu fakism, but Boston has a real novelty in this line. It is a woman who swallows not merely one sword, but a whole armful of them.

She is Victorina, from Berlin, and she has just come over the water to show Americans what real up-to-date sword swallowing is. In addition to taking a mouthful of swords, she introduces a few other tricks. One of these is to actually twist a sword around in her stomach. She also bends the stiff steel blade while it is in her throat by moving her head backward and forward.

There is no sleight-of-hand trick about this. A scientist has investigated sword swallowing and found out the how and why of it.

Professor Albert A. Hopkins, one of the editors of the Scientific American, accounts for it in his interesting book on "Magic, Stage Illusions and Scientific Diversions, Including Trick Photography."

The sword swallower, Professor Hopkins says, always has a most surprising effect upon his audience, although the feat is so old. The act seems so utterly impossible that most people think he resorts to some trick or illusion.

This, however, is not the case. The blade of the sword is actually passed through and into the stomach. This is made possible by the arrangement of the food passages which lead to the stomach. Long practice is also necessary to accustom the back parts of the mouth and the opening of the throat to the touch of unusual bodies like cold steel.

These parts are exceedingly sensitive and have to be trained and hardened to their new work.

As a general thing, any touching of the pharynx at the entrance to the throat causes strangling, pain and nausea, as every one knows from having a doctor examine his throat with a spoon. But the throat can be made to overcome this squeamishness. After practice it can be made to allow the passage of hard and unyielding substances.

Physicians are often called upon to feed patients by means of an esophageal tube, a hard rubber affair, which is put down through the throat in the same way that a sword is swallowed. The patient has to train his throat to admit the tube, just as the sword swallower does.

But before this really wonderful feat is done the stomach of the performer must be emptied through fasting.

150 YEARS' EXPERIMENTS WITH SUBMARINE BOATS.

By H. W. Wilson, Author of "Ironclads in Action."

THE trials of the *Gustave Zede* and the somewhat hasty conclusions of the *Furber* press that now at last a means has been discovered of rendering England's great strength in battle ships and cruisers valueless, have once more drawn attention to the submarine boat. It is not a novelty. In the *Gentleman's Magazine* of 1749 will be found an illustration of an existing submarine boat, lowered or raised by admitting water into or expelling it from "great leather bottles." The ship had four oars with which to move in the water.

An even earlier boat, which was constructed by a man named Symons, and which actually dived in the Dart, is described in the same volume of the magazine. In the war of the American Revolution a submarine boat is said to have been employed by the Americans; if such was really used it must have been of the type constructed in 1787 by Bushnell, of Connecticut. It is known that in the War of 1812 an attempt was made by Fulton's submarine to sink Sir Thomas Hardy's flagship, the *Ramilles*, while she was lying at anchor.

During the great war with France, the well-known American inventor, Fulton, had designed a submarine boat and submitted it to the Admiralty. Full details of it and various confidential reports are among the secret papers in the Record Office. The boat was declined, ostensibly because the invention was a devilish one. Crossing to France, Fulton constructed and tested a boat for the French Admiralty. It carried enough air for eight men during eight hours, it moved easily to and fro, and it actually destroyed with a torpedo of rude manufacture a hulk in Brest Harbor.

Yet it was rejected, probably because French naval men did not at all like exchanging the pure air and comfort of their wooden ships for what our seamen called "potted air" and misery. But this boat was certainly the first successful one, and may be regarded as the prototype of the *Zede*.

The first and only occasion on which a real submarine boat was successfully used in war was off Charleston, when, on February 17, 1864, the United States cruiser *Housatonic* was sent to the bottom by a Confederate boat which had been brought overland from Mobile. In her various trials this boat had sunk no less than five times—drowning at least twenty officers and men. Sometimes she was sent to the bottom by the wash of a passing vessel pouring in through an open manhole; more than once she caught her nose in the bottom and had to be recovered by divers.

In the attack on the *Housatonic* all on board perished. She is supposed to have entered the hole which her torpedo had made in the enemy's side, and so to have been carried down, though after the war divers found she had been carried by the current 100 feet from the *Housatonic*. This instance, at least, serves to prove that crews will always be found to volunteer for the most desperate enterprises.

The value attached by the French Admiralty to submarines led to the construction of several in the eighties. The most important of these were the *Goubet*, originally designed by an enthusiastic Irishman in America to help the dynamiters in their infamous schemes, was two years ago re-designed, and is now almost completed. Had it been of practical value in the Santiago campaign, it could have been ready. It runs by steam on the surface and by electricity under water, carries two 18-inch Whitehead torpedo tubes, and can steam fifteen knots when running with full power.

Nordenfelt, Holland and Perla boats. The Goubet type was small and light, the original pattern weighing under one and a half tons, and was driven by electricity stored in accumulators, or propelled by hand, at the rate of about five knots. Lieutenant Sleeman, in his classical work on torpedoes, states that no less than 200 of these vessels were ordered for Russia in 1881. If so they have vanished from her navy long since.

The boat has of late been improved, and the latest pattern, of which two have been constructed for Brazil, weighs ten tons, carries two Whiteheads, and has an arrangement of prisms and lenses which can be projected from the surface, enabling the observer in the boat to steer in fine weather. The field of view must, however, be necessarily very small.

The Nordenfelt boats, of which two were

built by Greece and two by Turkey in

1888, were large vessels of about 100 to 250 tons, with a radius of 500 miles and a speed of twelve knots. They could steam under water or on the surface, and carried two torpedo tubes. The conning tower, of one inch steel, projected above water in the partially submerged position. The vessels used steam as the propulsive and had four screws. On trial they performed excellent-

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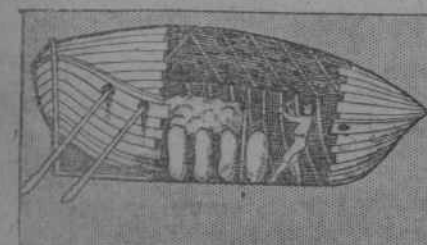
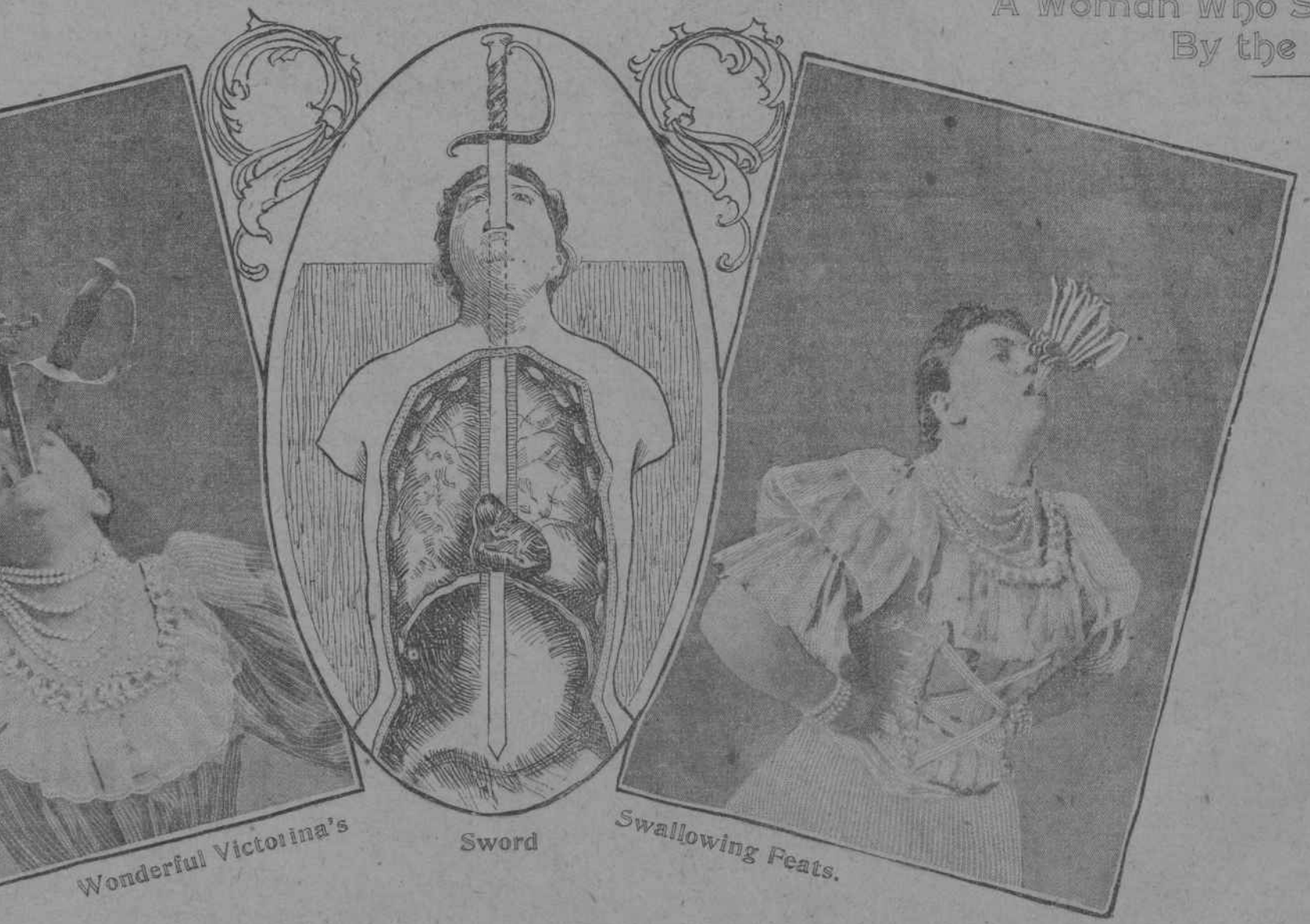
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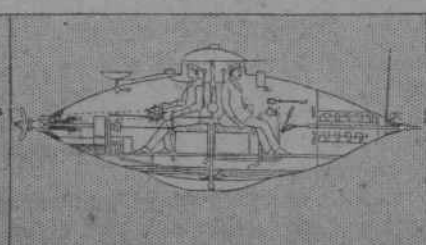
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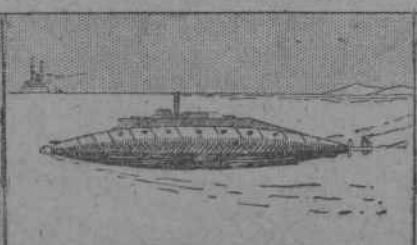
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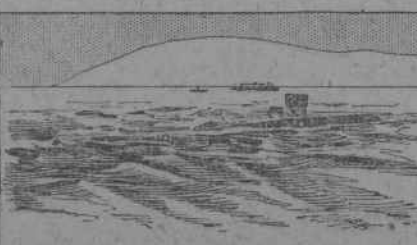
Egg-shaped Submarine Boat, 1749.



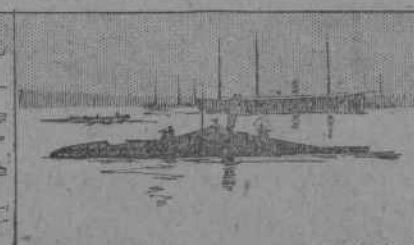
Goubet Submarine.



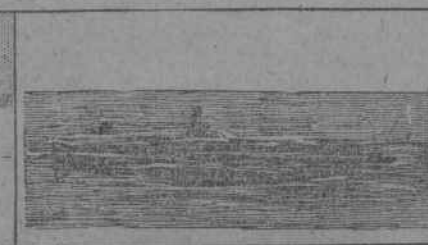
The Holland Boat.



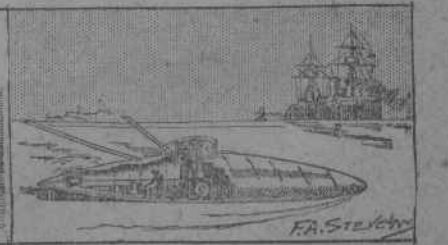
Gustave Zede, France's Latest.



The Nordenfalk (Germany).



Perla's Submarine Boat.



The "Peacemaker."